

PATENT ABSTRACTS OF JAPAN

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(54) INK JET RECORDING SHEET

(57)Abstract:

PURPOSE: To obtain an ink jet recording sheet suitable for full-color ink jet recording ensuring ink absorbability and preventing the exudation of ink in a printing part generated by the adhesion of water and hand sweat.

CONSTITUTION: In a coating type ink jet recording sheet, a cationic compd. is added to a support and in ink absorbing layer and the number average mol.wt. of the cationic compd. applied to or infiltrated into the support is 100000 or less and the adhesion amt. thereof is pref. 0.8meq./m² or more per a unit area.

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CLAIMS

[Claim(s)]

[Claim 1] The ink jet record sheet with which it comes to contain a cationic compound in this base material and this ink absorption layer, and coating or this cationic compound with which it sinks in is characterized by being a with a number average molecular weight of 100,000 or less thing at this base material in the ink jet record sheet of the coat type with which the ink absorption layer was painted on one side of the base material which uses wood pulp as a subject component.

[Claim 2] The ink jet record sheet according to claim 1 with which coating weight of coating or the cationic compound with which it sinks in is characterized by being more than 0.8meq./m² per unit area at a base material.

[Claim 3] The ink jet record sheet according to claim 1 with which an ink absorption layer is characterized by consisting of a cationic compound and an application constituent which uses adhesives as a subject component at a pigment list.

[Claim 4] The ink jet record sheet according to claim 1 or 2 to which a base material is characterized for a cationic compound content constituent by coating or coming to sink in by the on-machine.

[Claim 5] Claims 1-4 characterized by coming to paint a binder layer on the opposite side of a base material in which the ink absorption layer was prepared are the ink jet record sheets of a publication either.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] About an ink jet record sheet, in more detail, this invention secures ink absorptivity and relates to the ink jet record sheet suitable for the full color ink jet record which prevented the ink blot of the printing section produced by adhesion of water or ****.

[0002]

[Description of the Prior Art] Although an ink jet recording method makes the minute drop of ink fly by various working principles, and is made to adhere to record sheets, such as paper, and an image, an alphabetic character, etc. are recorded, development-fixing with the large versatility of a high speed, the low noise, ease [multiple-color-izing], and a record pattern has the descriptions, such as needlessness, and has spread quickly in various applications including the kanji as recording devices, such as various graphic forms and a color picture. Furthermore, the image formed by the multicolor ink jet method can acquire equal record as compared with the print by process printing by the platemaking method, or the color photography method. Moreover, in the application with which there is few creation number of copies and it can be managed, since it is cheap rather than it is based on a photograph technique, it is widely applied even to the full color image recording field.

[0003] The paper of fine quality and coat paper which are used for lithography, Toppan Printing, gravure, etc. were mentioned to the record sheet applied to an ink jet recording method, and the method of acquiring good image quality from an ink jet recording device

or the field of an ink presentation using these has been examined. However, by improvement in the speed of ink jet record, high-definition-izing of the image demanded, expansion of an application, etc., in order to satisfy these demands, it is becoming difficult only by the correspondence from this recording device or an ink presentation.

[0004] As a property required of a record sheet, the following items are mentioned as an example.

1. Improvement in the speed of ink jet record : ink absorptivity is early. If ink absorptivity falls, ink will be spread in addition to the printing section, and contamination of the blank paper part in the ink called a fall and greasing of the sharp nature accompanying hypertrophy of the diameter of a dot arises. Furthermore, this phenomenon becomes remarkable in the part with which ink laps.

2. High-definition-izing of an image : a printing dot should not be spread. Although the diameter of a dot is dependent also on a recording device, if it is spread after ink reaches a record sheet, color nature and sharp nature will fall and it will serve as an image which faded.

3. Expansion of an application : there needs to be no change of image quality at the passage of time. Don't be influenced of the environment used. For example, excelling in lightfastness, a water resisting property, and ozone resistance is mentioned.

[0005] Some proposals have been performed from the former to such a demand. Methods of preparing an ink absorption layer on a base material to the improvement in ink absorptivity, or diffusion prevention of a printing dot (JP,52-9074,A, 58-72495 official report, etc.), Approach using specific ** which adsorbs a color component paying attention to the distribution condition of the color component in the ink in an ink absorption layer influencing color nature and sharp nature (JP,55-144172,A) It is shown. Moreover, in order to raise lightfastness, a water resisting property, and ozone resistance, using a polyvinyl amine copolymerization object for the coating layer in making basic oligomer contain (JP,60-11389,A) and a base material or on a base material (JP,64-8085,A) etc. is shown.

[0006] However, while the demand to these properties becomes altitude gradually and it becomes severe From the ability to obtain easily on personal computer level, the image which was moreover excellent in image repeatability and color reproduction nature, such as sharp nature and color nature, [an ink jet recording device is cheap and] The ink jet recording device has changed to the general-purpose recording device from the special recording device used for a specific man. moreover, the image obtained -- printed matter, a photograph, and with distinction -- being hard -- it is impossible to solve from things problems, such as ink absorptivity which the ink jet record approach holds, lightfastness, a water resisting property, and ozone resistance Therefore, the present condition is that it is the indispensable condition of an ink jet recording apparatus or an ink jet record sheet to secure these properties.

[0007] It follows on diversification of an application. Furthermore, it is used for a poster or a POP art, or A binder layer is prepared in a rear face. The label for a price display, the label for a goods display (bar code), It pastes up to the adherend of label applications, such as a label for a quality display, a label for a measuring display, and an advertising spot label (sticker), and the large range well. Since the attachment activity is easy, since it becomes possible to also make the function which stuck with the sheet which is alike on the other hand and has a sensible-heat property, magnetic properties, and offset-printing

fitness through an adhesive layer, and was compounded add, the application to a ticket, a commuter pass, various cards, etc. is also spreading.

[0008] Although ink is classified into a solvent type and an aqueous type, it has been a technical problem with important prevention of the blot of the ink generated when water adheres to the printing side which water color ink holds from a price, safety, the ease of handling, etc. by diversification of many especially such [water color ink] an application. However, the present condition is that the measure to this technical problem is not fully taken, and it has been still more important and the technical problem which must be solved at an early stage in this record sheet that uses as the medium of an ink jet record sheet the base material which uses as a subject component the wood pulp which has a function as an ink absorber.

[0009]

[Problem(s) to be Solved by the Invention] In view of this present condition, in the ink jet record sheet recorded using water color ink, the purpose of this invention secures ink absorptivity and is to obtain the ink jet record sheet which prevented the ink blot of the printing section produced by adhesion of water or ****.

[0010]

[Means for Solving the Problem] Although the color nature and sharp nature which balanced the demand when color nature and sharp nature considered as the ink jet record sheet of the coat type which prepared the coated layer on the base material, as a result of this invention person's etc. repeating various researches about an ink jet record sheet are obtained In recent years, generating of the ink blot by adhesion of the water with which demand level increased, or **** could not be avoided, but it found out that it was indispensable that there is the need of corresponding from both a base material and a coated layer, especially to apply a specific cationic compound to a base material.

[0011] That is, in the ink jet record sheet of the coat type with which the ink absorption layer was painted on one side of the base material which uses wood pulp as a subject component, the ink jet record sheet of this invention comes to contain a cationic compound in this base material and this ink absorption layer, and is characterized by coating or this cationic compound with which it sinks in being a with a number average molecular weight of 100,000 or less thing at this base material.

[0012] Moreover, in the ink jet record sheet of this invention, it is desirable to a base material that the coating weight of coating or the cationic compound with which it sinks in is more than 0.8meq./m² per unit area.

[0013] Furthermore, in the ink jet record sheet of this invention, an ink absorption layer is preferably characterized by consisting of a cationic compound and an application constituent which uses adhesives as a subject component at a pigment list.

[0014] As for a base material, in the ink jet record sheet of this invention, it is desirable by the on-machine coating or to sink in and to become about a cationic compound content constituent.

[0015] In the ink jet record sheet of this invention, it has the description as a label or an ink jet record sheet of a tag application because a binder layer paints on the opposite side of a base material in which the ink absorption layer was prepared.

[0016] With the base material concerning this invention, wood pulp, such as recycled pulp, such as mechanical pulp, such as chemical pulp, such as LBKP and NBKP, GP, PGW, RMP and TMP, CTMP, and CMP, corrosion gage point, and DIP, is used as a

principal component. A conventionally well-known pigment, a binder, a sizing compound, a fixing agent, a yield improver, One or more sorts are mixed using various additives, such as a cation-ized agent and a paper reinforcing agent. It is the stencil paper manufactured with various equipments, such as a Fortlinear paper machine, a cylinder machine, and a twin-wired paper machine, and use of coated paper, such as the art paper and coat paper which prepared the coat layer on those stencil paper, and cast coated paper, is also still more possible. An ink absorption layer may be prepared in such stencil paper and coated paper as it is, and calender equipments, such as a machine calender, TG calender, and a software calender, may be used for them in order to control flattening. [0017] Since the opening which wood pulp and a pigment make will absorb ink if the pigment is contained five to 36% of the weight preferably 5% of the weight or more, it becomes unnecessary to apply an ink absorption layer to a base material so much. Moreover, what is necessary is for the basis weight of a base material not to be restricted especially, either, and just to choose it suitably according to an application, although it is generally 40 - 300 g/m².

[0018] It is desirable to consist of an application constituent which uses a pigment, adhesives, and a cationic compound as a principal component, and it can also blend suitably a color fixing agent, pigment agent, thickener, fluid amelioration agent, defoaming agent, foam suppressor, release agent, foaming agent, penetrating agent, coloring color, color pigment, fluorescent brightener, ultraviolet ray absorbent, anti-oxidant, antiseptics, ** motorcycle agent, deck-watertight-luminaire-ized agent, humid paper reinforcing agent, and desiccation paper reinforcing agent etc. with the ink absorption layer concerning this invention as an additive at these.

[0019] What is dissociated to a cation in a water medium is called cationic compound concerning this invention, and the 1st class, the 2nd class, the 3rd class amino group, and quarternary ammonium salt are mentioned as a typical cationic radical. Although anythings can be applied and especially the class is not limited if it is such a cationic compound, as a cationic compound applied to a base material, number average molecular weight needs to choose what is 100,000 or less. Here, if the molecular weight of a cationic compound is large exceeding 100,000, in order that the coat formed after desiccation may reduce the ink absorption capacity which a base material has, as number average molecular weight of the cationic compound which applies the cause which produces an ink overflow to a base material from things, it is limited to 100,000 or less thing.

[0020] moreover, as a cationic compound applied to a base material or an ink absorption layer Both a monomer oligomer and a polymer are applicable. As a polymer Polyalkylene polyamide; Polyalkylene polyurea; Polyamide polyurea; Poly amino epoxy resin; Or these A resultant with an aldehyde, and resultant [with an alkylating agent]; ring-opening-polymerization object [of ethyleneimine]; -- the homopolymerization object of cationic vinyl polymer, or copolymerization object [with other polymerization nature monomers]; -- the homopolymerization object of N-vinyl amide system monomer, or copolymerization object [with other polymerization nature monomers]; -- the polymer which has active hydrogen -- ammonia and the 1st class amine -- The reactant of secondary amine, the polymer which has Mannich reaction object; active hydrogen to which formaldehyde was made to react, and a cation-ized agent; The polymer and ammonia which have active hydrogen, Amines, chitosan which hydrolyzed the reactant;

chitin with epihalohydrin; the copolymerization object made to react using [any of the polymer which has active hydrogen, and an above-mentioned polymer they are, and] cross linking agents, such as an aldehyde, epihalohydrin, and the poly isocyanate, can be illustrated. In addition, it is an applying [among the cationic compounds mentioned above / suitably]-to base material-cationic compound which corresponds on the basis of number average molecular weight thing.

[0021] As a pigment used for a base material and an ink absorption layer, one or more sorts of well-known white pigments can be used. For example, precipitated calcium carbonate, whiting, a kaolin, talc, A calcium sulfate, a barium sulfate, a titanium dioxide, a zinc oxide, zinc sulfide, Zinc carbonate, a satin white, aluminum silicate, the diatom earth, a calcium silicate, A magnesium silicate, synthetic amorphous silica, colloidal silica, a colloidal alumina, Pseudo-boehmite, an aluminum hydroxide, an alumina, a lithopone, a zeolite, Organic pigments, such as white inorganic pigments, such as hydrated halloysite, a magnesium carbonate, and a magnesium hydroxide, a styrene system plastics pigment, an acrylic plastics pigment, polyethylene, a microcapsule, a urea-resin, and melamine resin, etc. can be used. Also in an above-mentioned pigment, a porous inorganic pigment is desirable, a porous amorphous composition silica, a porous magnesium carbonate, and a porous alumina are mentioned, and porous composition amorphous silica especially with the porous large volume is desirable.

[0022] Moreover, it is not restricted that the field where an ink absorption layer can also prepare more than two-layer on a base material, and is printed performs selection doubled with the demand of a mat tone, an art coat tone, a cast tone, a film tone, etc., either.

[0023] Furthermore, it is also possible to paint an ink absorption layer on both sides of a base material, and in order to secure curl fitness and note nature in the opposite side of the base material with which the ink absorption layer was painted, a back coat layer may be painted. Moreover, the function which stuck with the sheet which has a sensible-heat property, magnetic properties, and offset-printing fitness through an adhesive layer, and was compounded is made to add, and the application to a ticket, a commuter pass, various cards, etc. is also possible.

[0024] In a base material and an ink absorption layer, as adhesives, polyvinyl alcohol, Vinyl acetate, oxidization starch, etherification starch, a carboxymethyl cellulose, Cellulosics, such as hydroxyethyl cellulose, casein, gelatin, Soybean protein, silyl denaturation polyvinyl alcohol, etc.; Maleic-anhydride resin, Conjugated diene system copolymer latexes, such as a styrene-butadiene copolymer and a methyl methacrylate-butadiene copolymer; The polymer or copolymer of acrylic ester and methacrylic ester, acrylic polymer latexes [, such as a polymer of an acrylic acid and a methacrylic acid, or a copolymer,]; -- functional-group denaturation polymer latex; by functional-group content monomers, such as a carboxyl group of vinyl system polymer latexes [, such as an ethylene-vinyl acetate copolymer,]; or these various polymers, -- melamine resin -- Aquosity adhesives, such as heat-curing synthetic-resin systems, such as a urea-resin; Polymethylmethacrylate, Synthetic-resin system adhesives, such as polyurethane resin, an unsaturated polyester resin, a vinyl chloride-vinyl acetate copolymer, a polyvinyl butyral, and an alkyd resin, are mentioned, and one or more sorts of these can be used.

[0025] Number average molecular weight is restricted to 100,000 or less thing, it is made to dissolve in a base material underwater, and coating or the cationic compound which sinks in is used for it, when this compound is a solid. Although it can also be sunk [

coating or] in and is independently possible also for coating or sinking in in the constituent used together with an above-mentioned pigment and adhesives, since this compound becomes trustworthy [the effectiveness of this invention] by distributing this compound in the depth direction of a base material, it is desirable to infiltrate this compound.

[0026] a cationic compound -- a base material -- as coating or the amount to infiltrate -- this base material -- it is desirable to determine the cation loading dose per [to kick] unit area as criteria. Here, a cation loading dose is a product (meq. / m²) of the cation loading dose per unit weight (meq./g), and the coating weight per unit area of this compound (g/m²) which this compound measured by colloidal titration has.

[0027] the ink jet record sheet of this invention -- setting -- the cation loading dose per unit area -- 0.8meq(s)/m -- it is [two or more] desirable coating or to sink in to a base material so that it may become more than 1.0meq./m² preferably. This loading dose is 0.8meq(s). / m². In the following, it becomes difficult for the water with which are satisfied of the purpose, and the ink by adhesion of **** to ooze, and to avoid **.

[0028] Various equipments, such as various blade coaters, a roll coater, an air knife coater, bar coater, rod blade coater, curtain coater, short dwell coater, size press, and a spray, can be used for coating or the equipment which sinks in for the constituent which contains a cationic compound or this compound in a base material by the on-machine or the off-machine. The purpose of this invention is carried out to it being equipment of coating or the on-machine which sinks in still more certainly in succession [after especially the base material was milled].

[0029] By painting the constituent which uses an above-mentioned pigment, adhesives, and a cationic compound as a subject component, since an opening is secured, ink is absorbed or the ink absorption layer painted on a base material becomes that it is easy to make it established, it is desirable. As an amount of painting of this ink absorption layer, it is desirable to determine the cation loading dose per unit area of this ink absorption layer as criteria. the cation loading dose per unit area -- 0.2meq(s)/m -- it is desirable to paint on a base material two or more, so that it may become more than 0.7meq./m² preferably. This loading dose is 0.2meq(s). / m². It becomes difficult for the water which is satisfied with the following of the purpose, and the ink by adhesion of **** to ooze, and to avoid **.

[0030] As equipment which paints an ink absorption layer, various equipments, such as various blade coaters, a roll coater, an air knife coater, bar coater, rod blade coater, curtain coater, short dwell coater, size press, and a spray, can be used by the on-machine or the off-machine. Moreover, after painting an ink absorption layer, you may finish using calenders, such as a machine calender, TG calender, a supercalender, and a software calender.

[0031] The use as a tuck sheet which prepared the binder layer in the opposite side of the base material with which especially the ink absorption layer was painted is expanded with application expansion of an ink jet record sheet. In this tuck sheet, the environment used is various and an opportunity to be used outside of a room and for ink blot **** by adhesion of the water to the printing section, such as adhesion of the rain and snow to a tuck sheet front face and adhesion of **** at the time of conveyance, produce increases with a cold edible price display tuck sheet as compared with the operating environment of the conventional ink jet record sheet in **** of the water in a front face, and the object

for physical distribution managements. Since it is such, in a tuck sheet application, the demand level of water or the ink by adhesion of **** which receives oozing out becomes it is high and possible [satisfying this demand with the ink jet record sheet of this invention].

[0032] Although the approach of forming a binder in the remover spreading side of the releasing paper described below, and sticking by pressure a binder side and the field where the ink absorption layer of an ink acceptance sheet is not painted with a press roll etc. in piles is generally performed, the binder layer concerning this invention applies a binder to this acceptance sheet rear face previously, and may stick it with a releasing paper. The binder of a rubber system or an acrylic resin system can be used for this binder. the main raw material of a rubber system -- natural rubber or styrene butadiene rubber -- it is -- natural rubber -- rosin system resin -- a plasticizer -- ** -- it *****, and it usually carries out coating, using normal hexane as a solvent. Moreover, coating is fused and carried out when styrene butadiene rubber is used as the main raw material. In an acrylic resin system, the polymerization of the acrylic monomers, such as 2-ethylhexyl acrylate, butyl acrylate, ethyl acrylate, an acrylic acid, and beta-hydroxyethyl acrylate, is carried out, and they are made. The emulsion type which carried out the polymerization can be used using organic solvents, such as ethyl acetate and toluene, or making it emulsify underwater by the approach of a polymerization using a surface active agent.

[0033] In order to raise physical properties, such as the thermal resistance of a binder, and solvent resistance, moreover, in the above-mentioned raw material May carry out crosslinking reaction using cross linking agents, such as an isocyanate system, a melamine system, and a metal chelate system, and A silica, a kaolin, clay, a calcium carbonate, an aluminum hydroxide, Add pigments, such as a zinc oxide, titanium oxide, a melamine resin particle, and a starch granule child, or To a water soluble polymer, petroleum system resin, various paraffin wax, a fatty acid or its derivative, higher alcohol, metallic soap, silicone, and a pan, an antistatic agent, a thickener, a dispersant, antiseptics, an antioxidant, a defoaming agent, etc. may be added. These binders should just make selection doubled with the application for which the ink jet record sheet for labels is used.

[0034] There are a slot nozzle besides an air knife coater, blade coater, bar coater, and a roll coater, a slot die, a rotary screen printer, gravure coater, offset gravure coater, a hot melt wheel, a spiral spray, etc. in the equipment which forms a binder, and the need of giving a pattern to the class of binder and coverage, and the applied binder etc. should just perform selection suitable for an application suitably.

[0035] Moreover, as a base material of a releasing paper, there are paper of fine quality, kraft paper, glassine, plastic film, etc., and silicone resin is applied as a remover on these base materials. In the case of a paper system base material, thermoplastics is laminated in a base material and detachability of direction which acquired the smooth field improves. What applied silicone resin to the paper system base material directly A direct type, What was applied after laminating thermoplastics on a paper base The poly lamination type, The criteria which what was directly applied on plastic film is called a film type, and are chosen as a releasing paper from each It is in being the adhesive strength below the exfoliation force of this labeler at the time of attachment by having the adhesive strength which a releasing paper is in the middle of conveyance, and does not separate within an ink jet recording apparatus, and the automatic labeler. Therefore, when curl fitness still

needs to be secured, it is [that what is necessary is just to choose the releasing paper which suited the application] desirable to laminate thermoplastics in the opposite side of the base material which applied silicone resin, or to coat it with synthetic resin as rear-face processing. Moreover, the remover of a non-silicone system may be used for a special application.

[0036] The water color ink as used in the field of this invention is a coloring agent, a solvent object, and a record liquid that consists of other additives.

[0037] As a coloring agent, water soluble dye, such as direct dye, acid dye, basic dye, reactive dye, or a food dye, is mentioned.

[0038] Moreover, the method of making water color ink fly is not restricted to a piezo method, a bubble method, etc.

[0039] As a solvent of water color ink, water and water-soluble, various organic solvents For example, methyl alcohol, ethyl alcohol, n-propyl alcohol, Isopropyl alcohol, n-butyl alcohol, and sec-butyl alcohol, Alkyl alcohols of the carbon numbers 1-4, such as tert-butyl alcohol and isobutyl alcohol; Dimethylformamide, Amides, such as dimethylacetamide; Ketones, such as an acetone and diacetone alcohol, or a ketone-alcohol; tetrahydrofuran, Ether, such as dioxane; Polyalkylene glycols; ethylene glycol, such as a polyethylene glycol and a polypropylene glycol, Propylene glycol, a butylene glycol, triethylene glycol, 1, 2, 6-hexane triol, thiodiglycol, hexylene glycol, alkylene groups, such as a diethylene glycol, -- 2-6 alkylene glycol; -- a glycerol -- The low-grade alkyl ether of polyhydric alcohol, such as ethylene glycol methyl ether, the diethylene-glycol methyl (or ethyl) ether, and the triethylene glycol monomethyl ether, is mentioned. Also in the water-soluble organic solvent of these many, the low-grade alkyl ether of polyhydric alcohol, such as polyhydric alcohol, such as a diethylene glycol, the triethylene glycol monomethyl ether, and the triethylene glycol monoethyl ether, is desirable. As other additives, a pH regulator, a sequestering agent, an antifungal agent, a viscosity controlling agent, a surface tension regulator, a wetting agent, a surfactant, a rust-proofer, etc. are mentioned, for example.

[0040] The ink jet record sheet concerning this invention may be used as what kind of record sheet which uses liquefied ink at the time of record. The thermofusion nature ink which uses the thermofusion nature matter, dyes and pigments, etc. as a principal component For example, a resin film, The ink sheet applied on thin base materials, such as high density paper and a synthetic paper, is heated from the rear face. Heating fusion of the television sheet for thermal transfer recording and thermofusion nature ink which are made to carry out melting of the ink and imprint it is carried out. The formation of a minute drop, The television sheet corresponding to the sensitization pressure-sensitive mold donor sheet using the microcapsule which connoted the ink jet record sheet which carries out flight record, the ink jet record sheet using the ink which dissolved the oil color in the solvent, a photopolymerization mold monomer, and colorless or colored dyes and pigments etc. is mentioned.

[0041] The common feature of these record sheets is a point that ink is in a liquid condition at the time of record. Liquefied ink goes as osmosis or ** by hardening, solidification, or fixing to the depth direction or horizontal direction of an ink absorption layer of a record sheet. The various record sheets mentioned above need the absorptivity according to each method, and even if it uses as various kinds of record sheets which mentioned above the ink jet record sheet of this invention, or a record sheet for tucks

which carried out tuck processing of them, they are not cared about at all.

[0042] Furthermore, the ink jet record sheet in this invention may be used as the record sheet for electrophotography record which carries out heating fixing of the toner of the electrophotography recording method currently widely used for the copying machine, the printer, etc., or an electrophotography record sheet for labels.

[0043]

[Function] The ink absorptivity which this invention makes the purpose is required to control diffusion as much as possible while ink permeates a medium promptly. Moreover, it is required that the ink which is aqueous should not remelt prevention of an ink blot of the printing section produced by water or **** in response to the effect of moisture. Ink mainly consists of a color component and a solvent component, and becomes it is possible to secure ink absorptivity and possible [securing osmosis of this solvent component by preparing a coated layer in a base material or its front face, making an opening physically, and raising the volume of this opening] by absorbing this solvent component alternatively. However, since this color component also permeates in connection with this solvent component, if this color component advances osmosis in the depth direction, printing concentration will fall in proportion to it, and aggravation of color nature will arise.

[0044] Therefore, it is necessary to capture this color component alternatively and to fix it, it reacts with the sulfonate or carboxylate which this color component has, and it is required for water to generate an insoluble salt. Although a reaction with a cationic compound can be considered from this, the ink blot produced not only in response to reservation of ink absorptivity but in response to the effect of moisture cannot be prevented only by applying this compound.

[0045] It becomes possible to obtain the ink jet record sheet with which it is satisfied of the purpose only by making a base material and an ink absorption layer contain a cationic compound and making a base material contain the cationic compound which has further specific molecular weight as this invention shows. Although the ink jet record sheet with which a base material uses wood pulp as a subject component is cheap and ink absorption capacity is in the base material itself, the ink printed even if it painted the ink absorption layer on this base material penetrates this ink absorption layer, and reaches this base material, and even if the cationic compound contains in this ink absorption layer, the color component in ink will permeate this base material. This captures this color component in this ink absorption layer, since penetration time is quicker than the established time amount, it is surmised that that this color component has permeated the base material originates, and the function which captures this color component also to this base material, and is fixed to it is needed.

[0046] However, it is necessary to make the cationic compound which does not come to solve the purpose of this invention only by making a base material and an ink absorption layer contain a cationic compound, and has specific molecular weight in this base material contain. That is, if the molecular weight of the cationic compound applied to this base material is large, the formation coat after desiccation reduces the ink absorption capacity which this base material has, and since it becomes the cause of producing an ink overflow, as number average molecular weight of the cationic compound applied to a base material, it will be limited to 100,000 or less thing.

[0047] Moreover, for the amount of the cationic compound applied to a base material,

although it is dependent on the class of ink jet recording apparatus, the cation loading dose per unit area is both 0.8meq(s). / m2. If it is above, the purpose of this invention will become certain.

[0048] To a base material, in a cationic compound, direct coating or when sinking in, an on-machine is more desirable than an off machine. This is because it originates in the size nature which a base material uses wood pulp as a subject component, and discovers with time after paper milling influencing distribution of coating or this compound at the time of sinking in. Since the function which captures the color component in ink also to a base material, and is fixed to it is required like ****, it is desirable for a cationic compound to exist in the interior of this base material, and the manifestation of size nature may reduce fixing of this color component, in order to check distribution of this compound. In order to mitigate the manifestation of size nature from this, it is desirable to carry out immediately after milling a base material in off machine coating or sinking in, and if it is an on-machine, coating or since it can sink in, it is still more suitable for a paper-milling process and continuation.

[0049]

[Example] Although the example of this invention is given and explained below, this invention is not limited to these examples. Moreover, especially the "section" and "%" shown in an example, unless it shows clearly, weight section and weight % is shown.

[0050] The ratio of precipitated calcium carbonate / whiting / talc made the <base material> constituent the pigment 25 section of 30/35/35, the commercial alkyl ketene dimer 0.10 section, the commercial cation system acrylamide 0.03 section, the commercial cation-ized starch 1.0 section, and the sulfuric-acid band 0.5 section to the wood pulp 100 section which consists of the LBKP(freshness 400mlcsf)70 section and the NBKP(freshness 450mlcsf)30 section. After preparation, paper was milled by basis-weight 90 g/m2 using the Fortlinear paper machine, and the base material was obtained.

[0051] The cationic compound A shown in the <cationic compound> table 1 - E were applied to the base material and the ink absorption layer.

[0052]

[Table 1]

名称	組 成	数平均 分子量	カチオン 荷電量 meq./g
A	ジメチルアミンエピクロヒドリン重合物	1200	7.0
B	ジシアンジアミドホルムアルデヒド重合物	40000	10.0
C	アクリルアミドジアリルアミン重合物	100000	3.5
D	ポリビニルアミン・アクリロニトリル重合物	300000	5.5
E	ポリアクリルアミド	1500000	4.0

[0053] The gate roll coater of an off-machine was used for the front face of example 1 base material, and 0.5g /of 30% water solutions of cationic compound A was made to adhere to it two times m. the cation loading dose per unit area of this base material -- 1.05meq(s). / m2 it is . The ink absorption layer was painted on the front face of this base material. Synthetic amorphous silica (fine seal X37B: Tokuyama Soda Co., Ltd. make) this ink absorption layer The 100 sections, Consist of an application constituent with which the 30 sections consist [colloidal silica (Snow tex-O: Nissan Chemical Industries, Ltd. make)], and the 40 sections and cationic compound A consist [polyvinyl alcohol (PVA117: Kuraray Co., Ltd. make)] of the 30 sections, and these are prepared. At 15%

of solid content concentration, coating desiccation was carried out so that the amount of desiccation coating might be set to 10g/m² by the air knife coater, calender processing was performed after that, and the ink jet record sheet of an example 1 was obtained.

[0054] The ten sections and commercial oxidized starch are the constituent of 5% of solid content concentration with which the size press equipment of an on-machine is used for the front face of example 2 base material, and cationic compound A consists of the 90 sections 30 g/m². It was made to sink in. The cation loading doses per unit area of this base material are 1.05meq(s) / m². Preparation, coating, desiccation, and calender processing were performed for the ink absorption layer which consists of the application constituent same on the front face of this base material as an example 1 on the same conditions, and the ink jet record sheet of an example 2 was obtained.

[0055] The gate roll coater of an off machine was used for the front face of example 3 base material, and the oxidized starch which the cationic compound C used in the 50 sections and the example 2 carried out 5 g/m² coating of the constituent of 10% of solid content concentration which consists of the 50 sections. the cation loading dose per unit area of this base material -- 0.88meq(s) / m² it is . Preparation, coating, desiccation, and calender processing were performed for the ink absorption layer which consists of the application constituent same on the front face of this base material as an example 1 on the same conditions, and the ink jet record sheet of an example 3 was obtained.

[0056] The size press equipment of an on-machine was used for the front face of example 4 base material, and the oxidized starch which the cationic compound B used in the 60 sections and the example 2 infiltrated into it the constituent of 5% of solid content concentration which consists of the 40 sections two times 30 g/m. the cation loading dose per unit area of this base material -- 9.00meq(s) / m² it is . The ink absorption layer was painted on the front face of this base material. Synthetic amorphous silica (fine seal X37B: Tokuyama Soda Co., Ltd. make) this ink absorption layer The 100 sections, Consist of an application constituent with which the 30 sections consist [colloidal silica (Snow tex-O: Nissan Chemical Industries, Ltd. make)], and the 40 sections and the cationic compound B consist [polyvinyl alcohol (PVA117: Kuraray Co., Ltd. make)] of the 30 sections, and these are prepared. At 15% of solid content concentration, coating, desiccation, and calender processing were performed on the same conditions as an example 1, and the ink jet record sheet of an example 4 was obtained so that the amount of desiccation coating might be set to 10g/m² by the air knife coater.

[0057] The oxidized starch which used the size press equipment of an off machine for the front face of example 5 base material, and cationic compound A used for it in the 50 sections and the example 2 infiltrated the constituent of 5% of solid content concentration which consists of the 50 sections two times 30 g/m. the cation loading dose per unit area of this base material -- 5.25meq(s) / m² it is . The ink absorption layer was painted on the front face of this base material. Synthetic amorphous silica (fine seal X37B: Tokuyama Soda Co., Ltd. make) this ink absorption layer The 100 sections, Consist of an application constituent with which the 30 sections consist [colloidal silica (Snow tex-O: Nissan Chemical Industries, Ltd. make)], and the 30 sections and the cationic compound C consist [polyvinyl alcohol (PVA117: Kuraray Co., Ltd. make)] of the 30 sections, and these are prepared. At 15% of solid content concentration, coating, desiccation, and calender processing were performed on the same conditions as an example 1, and the ink jet record sheet of an example 5 was obtained so that the amount of desiccation coating

might be set to 10g/m² by the air knife coater.

[0058] The size press equipment of an off machine was used for the front face of example 6 base material, and the oxidized starch which the cationic compound C used in the 50 sections and the example 2 infiltrated into it the constituent of 5% of solid content concentration which consists of the 50 sections two times 30 g/m. the cation loading dose per unit area of this base material -- 2.63meq(s). / m² it is . Preparation, coating, desiccation, and calender processing were performed for the ink absorption layer which consists of the application constituent same on the front face of this base material as an example 1 on the same conditions, and the ink jet record sheet of an example 2 was obtained.

[0059] Example 7 base material was infiltrated on the same constituent as an example 4, and conditions. The ink absorption layer was painted on the front face of this base material. Synthetic amorphous silica (fine seal X37B: Tokuyama Soda Co., Ltd. make) this ink absorption layer The 100 sections, Consist of an application constituent with which the 30 sections consist [colloidal silica (Snow tex-O: Nissan Chemical Industries, Ltd. make)], and the 30 sections and the cationic compound D consist [polyvinyl alcohol (PVA117: Kuraray Co., Ltd. make)] of the 30 sections, and these are prepared. At 15% of solid content concentration, coating, desiccation, and calender processing were performed on the same conditions as an example 1, and the ink jet record sheet of an example 7 was obtained so that the amount of desiccation coating might be set to 10g/m² by the air knife coater.

[0060] Example 8 base material was infiltrated on the same constituent as an example 2, and conditions. The ink absorption layer was painted on the front face of this base material. Synthetic amorphous silica (fine seal X37B: Tokuyama Soda Co., Ltd. make) this ink absorption layer The 100 sections, Consist of an application constituent with which the 30 sections consist [colloidal silica (Snow tex-O: Nissan Chemical Industries, Ltd. make)], and the 25 sections and cationic compound E consist [polyvinyl alcohol (PVA117: Kuraray Co., Ltd. make)] of the 30 sections, and these are prepared. At 15% of solid content concentration, by the same conditions as an example 1, coating, desiccation, and calender processing were performed and the ink jet record sheet of an example 8 was obtained so that the amount of desiccation coating might be set to 10g/m² by the air knife coater.

[0061] Example 9 base material was infiltrated on the same constituent as an example 6, and conditions, performed preparation, coating, desiccation, and calender processing for the application constituent same on the front face of this base material as an example 8 on the same conditions, and obtained the ink jet record sheet of an example 9.

[0062] The gate roll coater of an off machine was used for the front face of example of comparison 1 base material, and the oxidized starch which cationic compound E used in the 50 sections and the example 2 carried out 5 g/m² coating of the constituent of 10% of solid content concentration which consists of the 50 sections. the cation loading dose per unit area of this base material -- 1.00meq(s). / m² it is . Preparation, coating, desiccation, and calender processing were performed for the ink absorption layer which consists of the application constituent same on the front face of this base material as an example 1 on the same conditions, and the ink jet record sheet of the example 1 of a comparison was obtained.

[0063] The size press equipment of an on-machine was used for the front face of example

of comparison 2 base material, and the cationic compound D of 5% of solid content concentration was infiltrated into it two times 30 g/m. the cation loading dose per unit area of this base material -- 8.25meq(s). / m² it is . Preparation, coating, desiccation, and calender processing were performed for the ink absorption layer which consists of the application constituent same on the front face of this base material as an example 4 on the same conditions, and the ink jet record sheet of the example 2 of a comparison was obtained.

[0064] The size press equipment of an off machine was used for the front face of example of comparison 3 base material, and the oxidized starch which cationic compound E used in the 50 sections and the example 2 infiltrated into it the constituent of 5% of solid content concentration which consists of the 50 sections two times 30 g/m. the cation loading dose per unit area of this base material -- 3.00meq(s). / m² it is . Preparation, coating, desiccation, and calender processing were performed for the ink absorption layer which consists of the application constituent same on the front face of this base material as an example 5 on the same conditions, and the ink jet record sheet of the example 3 of a comparison was obtained.

[0065] Example of comparison 4 base material was infiltrated on the same constituent as the example 3 of a comparison, and conditions. The ink absorption layer was painted on the front face of this base material. Preparation, coating, desiccation, and calender processing were performed for the ink absorption layer which consists of the application constituent same on the front face of this base material as an example 8 on the same conditions, and the ink jet record sheet of the example 4 of a comparison was obtained.

[0066] example of comparison 5 base material -- a cationic compound -- coating -- or it did not sink in but the ink absorption layer was painted on the front face of this base material. Preparation, coating, desiccation, and calender processing were performed for the ink absorption layer which consists of the application constituent same on the front face of this base material as an example 5 on the same conditions, and the ink jet record sheet of the example 5 of a comparison was obtained.

[0067] Example of comparison 6 base material was infiltrated on the same constituent as an example 6, and conditions. The ink absorption layer was painted on the front face of this base material. Except not applying a cationic compound, the application constituent of an ink acceptance layer performed preparation, coating, desiccation, and calender processing on the same conditions as an example 1 as the same as an example 1, and obtained the ink jet record sheet of the example 6 of a comparison.

[0068] The evaluation result of examples 1-9 and the examples 1-6 of a comparison is shown in Table 2. In addition, the following approaches estimated the property item in Table 2.

[0069] Ink absorptivity important for a <evaluation of ink absorptivity> ink jet recording characteristic was evaluated from ink absorption time amount and an ink overflow. As these two evaluations, A or B evaluation is required respectively.

1. If the time amount which absorbs ink absorption time amount ink is late, since the ink which is not absorbed will contact this equipment during conveyance within an ink jet recording device, there will be generating of the greasing which soils the part which is not printed not only in the printing part and image grace will be reduced greatly, the early thing of ink absorption time amount is needed for an ink jet record sheet.

- The evaluation approach : using the commercial ink jet record printer (desk writer

550C: product made from Hewlett Packard), black ink performed solid printing, the front face of a printing part was covered in the blank paper immediately after printing, and the following criteria estimated the ink imprinted by the blank paper.

A: The imprint of ink is not checked but ink absorption time amount is early.

B: It does not become a greasing although the imprint of ink is checked slightly.

C: The whole surface has the imprint of ink and a greasing may be generated.

[0070] 2. Originally it becomes easy for the clear nature of the printed dot or a field to fall with improvement in the speed of an ink overflow ink jet recording device. In the part which the ink in which especially colors differ adjoins, since the ink which adjoined when the condition that ink overflowed when ink absorptivity was low continued is united and it becomes the fall of color nature or clear nature, it is necessary for there to be no ink overflow.

- The evaluation approach : using the above-mentioned ink jet record printer, it printed so that the heavy printing parts of Magenta ink and yellow ink might be adjoined in the heavy printing parts of cyanogen ink and yellow ink, and the following criteria estimated the boundary part.

A: The boundary part is clear and an ink overflow is not accepted.

B: Although a boundary line is checked by looking black in fragments, it does not become the fall of color nature or clear nature.

C: A boundary line is checked by looking black continuously and serves as a fall of color nature or clear nature.

[0071] <Water resisting property> When water and **** adhered to the printed part, in the printing part, ink oozed out and it evaluated by the following approaches from becoming the fall of color nature or clear nature. With [the rate of an ink blot computed by this approach] 1.2 [or less], it is level permitted practically.

- The evaluation approach : using an above-mentioned ink jet record printer, draw a straight line in Magenta ink and measure a linear size (WB). Then, the size (WA) of the straight line after dropping the water of 50microl on a straight line and leaving it for 24 hours is measured. When an ink blot occurs, the rate (WA/WB) of an ink blot will exceed 1.0. Using image-analysis equipment, measurement was made binary by the mode method, was performed, made beforehand the straight line (L1) measured and the straight line (L2) which crosses perpendicularly, moved the parallel lines of L2 to the measurement part, and asked for the size of the straight line (L1) of the back before water dropping.

[0072]

[Table 2]

実施例 又は 比較例	支持体の塗工 又は含浸内容		インク吸収層 に適用された カチオン性化 化合物の名称	インク吸収性		耐水性 インク しみ率 W_A/W_D
	カチオン性 化合物 の名称	カチオン 荷電量 $meq./m^2$		インク 吸収 時間	インク 溢れ	
実施例1	A	1.05	A	A	A	1.16
実施例2	A	1.05	A	A	A	1.09
実施例3	B	0.88	A	A	A	1.18
実施例4	B	9.00	B	A	A	1.02
実施例5	A	5.25	C	A	A	1.10
実施例6	C	2.63	C	A	A	1.11
実施例7	B	9.00	D	A	B	1.08
実施例8	A	1.05	E	A	B	1.12
実施例9	C	2.63	E	A	B	1.17
比較例1	E	1.00	A	B	C	1.52
比較例2	D	8.25	B	B	C	1.13
比較例3	E	3.00	C	C	C	1.18
比較例4	E	3.00	E	C	C	1.25
比較例5	—	—	C	A	A	2.01
比較例6	C	2.63	—	A	A	3.28

[0073]

[Effect of the Invention] As mentioned above, even if according to this invention it secures ink absorptivity and water and **** adhere the cationic compound which has specific molecular weight in a base material by containing a cationic compound in a base material and an ink absorption layer coating or by sinking in so that clearly, the ink jet record sheet which controlled the blot broth of ink is obtained.